FOLIA MEDICA CRACOVIENSIA
Vol. LXII, 2, 2022: 71–92
PL ISSN 0015-5616
DOI: 10.24425/fmc.2022.141701

The growing need for reliable online health information during lockdown in Europe: An infodemiologic analysis of myocardial infarction management in the COVID-19 era

Dominik Felkle[1], Michał Ł. Korman[1], Andrzej Surdacki[2]

[1]Students' Scientific Group at Second Department of Cardiology, Institute of Cardiology, Faculty of Medicine, Jagiellonian University Medical College, Kraków, Poland
[2]Second Department of Cardiology, Institute of Cardiology, Faculty of Medicine, Jagiellonian University Medical College, Kraków, Poland

Corresponding author: Dominik Felkle
Students' Scientific Group at Second Department of Cardiology, Institute of Cardiology
Faculty of Medicine, Jagiellonian University Medical College
ul. Jakubowskiego 2, 30-688 Kraków, Poland
Phone: +48 12 400 22 00; E-mail: dominikfelkle@gmail.com

Abstract: Introduction: The COVID-19 pandemic has put healthcare systems worldwide under huge strain, resulting in a significant loss of their capacity and availability. Patients have become more reluctant to contact their doctors or call an ambulance in case of myocardial infarction (MI) symptoms onset. It has been accompanied by a significant decrease in the number of coronary angiography and PCI procedures performed.
Objectives: The aim of the study is to evaluate the role of online health information in the patient-dependent phase of MI management during the COVID-19 lockdown in Europe.
Methods: We analyzed Google Trends data on the popularity of phrases related to MI symptoms, respiratory tract infection, urological complaints, and terms unrelated to health, for the period of the first COVID-19 lockdown, along with the data from the corresponding weeks from 2017–2019 in seven European countries.
Results: The search volume for particular symptoms of myocardial infarction increased in all studied countries, compared to the analogous period from 2017–2019, with a significant increase in for *chest pain*, *shortness of breath*, *fear*, and *palpitations* in most countries. These changes have not been accompanied by increased interest in terms related to respiratory tract infection symptoms and urological complaints.
Conclusions: Our findings suggest that during lockdown, patients with MI symptoms may have tried to manage their complaints on their own, using information from the Internet. This demonstrates the growing role of the Internet in the patient's decision-making process in the emergency situation, indicating a growing need for reliable and freely available online information provided by healthcare professionals.

Keywords: acute myocardial infarction, COVID-19, lockdown, Google Trends, infodemiology.

Submitted: 05-May-2022; **Accepted in the final form:** 20-Jun-2022; **Published:** 30-Jul-2022.

Introduction

The COVID-19 pandemic has put healthcare systems around the world under immense strain. Emergency services have been flooded with patients infected with coronavirus. To cope with the increasing number of cases, hospitals have had to limit regular admissions and postpone elective procedures. Outpatient clinics have become reluctant to admit patients in person [1, 2].

The pandemic has also had a significant impact on the approach of patients to health maintenance. Lockdowns, isolation, and the perceived imminent threat of infection have affected their physical, mental and social well-being [3]. Furthermore, many of them have reported fear of contact with medical services, leading to a decreased number of patients who visit their doctors, despite suffering from serious symptoms [4].

Acute myocardial infarction (MI) represents one of the most serious and common conditions that require immediate medical attention, the treatment of which has been impaired by the pandemic. Studies carried out in the United Kingdom, France, Italy, Poland, and other countries showed a 45% decrease in lifesaving procedures, such as coronary angiography and percutaneous intervention, in patients suffering from MI [5–9]. Furthermore, in our recent study, we have shown that almost 40% of patients in rural areas would not decide to go to the hospital or call an ambulance in case of onset of MI symptoms, due to fear of hospital-acquired COVID-19 infection or inadequate medical care due to pandemic [10].

These observations have led us to ask where patients sought help in case of MI symptoms occurrence during the first lockdown between March and June 2020. We decided to conduct an infodemiologic analysis, based on the data on online search traffic provided by Google Trends, a freely available tool used for examining patterns of online activity. It has been previously applied in the evaluation of decision-making in health-related topics and in the prediction of disease occurrence [11, 12], showing great potential in forecasting future trends [13]. Furthermore, the Google Trends search volume for queries related to cardiovascular complaints has been shown to correlate with disease incidence and mortality [14, 15].

Materials and Methods

Study design

An infodemiologic analysis was performed, based on the Google search volume of phrases related to myocardial infarction symptoms. Data were collected using the Google Trends tool, which provides information on the popularity of search queries in different countries and languages. For the purpose of the analysis, four queries

corresponding to common symptoms of MI: *chest pain*, *shortness of breath*, *fear*, and *palpitations* were selected, along with the general phrase *myocardial infarction symptoms*.

To put the data into context, we provided three additional groups of queries. The first group involved symptoms of respiratory tract infection (RTI), the prevalence of which could have been potentially influenced by the COVID-19 pandemic (*cough*, *runny nose*, *fever*, *sore throat*). The second comprised urological complaints, which were not directly related to the COVID-19 outbreak (*kidney stones*, *blood in urine*, *cystitis*, *frequent urination*). Finally, to estimate the influence of the lockdown on the general Internet traffic, the third group consisting of terms unrelated to health was proposed (*Alexander the Great*, *hard disk*, *squirrel*, *pear*).

The analysis was carried out in the official languages of seven European countries: the United Kingdom (UK), Spain (ES), France (FR), Germany (DE), Italy (IT), Poland (PL), and Russia (RU) for the period between 22 March and 4 July 2020, along with the corresponding weeks from 2017–2019.

Data acquisition and transformation

Data were collected from the official Google Trends website. Queries from the same category were collected simultaneously. To allow intergroup comparison, the average relative search volume (RSV) was calculated for each query from the MI symptoms group, and then the term with the median value (MID) was chosen. Subsequently, the MID was imported together with the three remaining groups of queries to estimate the adjusted search volume (ASV), using the following formula:

$$\mathrm{ASV} = \frac{\text{average MID in group of MI symptoms}}{\text{average MID in group n}} \times \text{RSV in group n}$$

where n is the ordinal numeral of the query group.

In accordance with the recommendation of Nuti *et al.*, data acquisition plan scheme and details are provided in the Appendices (Fig. S1 and Table S4) [16]. Estimates were reported in compliance with the GATHER statement.

Statistical analysis

Statistical analysis and data visualization were performed using the R software (version 1.2.5042). Numerical data were reported as medians accompanied by an interquartile range (IQR). To compare estimates between the studied periods, each week of COVID-19 lockdown was paired with the average RSV/ASV from the respective weeks of years 2017–2019, and Wilcoxon's signed-rank test was applied. The significance level was set at 0.05. A detailed statistical analysis plan (Appendices: Fig. S2 and Fig. S3) followed by an analytic code has been published.

Results

Between 22 March and 4 July 2020, the search volume for myocardial infarction symptoms increased in all studied countries, compared to the same period from 2017–2019. The highest growth has been observed in France (+30.86%), followed by +29.90% in the UK, +26.94% in Spain, +26.48% in Italy, +25.14% in Russia, +24.12% in Poland, and +12.96% in Germany (Fig. 1).

Further analysis revealed a significant increase in RSV for *chest pain* and *shortness of breath* in all countries, with the highest rise in the median in France (+100%) and Italy (+200%), respectively. The search volume of *fear* increased in six countries, ranging from +7.92% in Germany to +20.83% in France, with Russia being an exception. The rise in interest in term *palpitations* occurred in four countries and extended from +19.76% in Spain to +50.38% in Russia. However, there were no significant differences in interest in *myocardial infarction symptoms* in five out of seven countries. We observed only a rise in Poland (+42.83%) and a decline in Spain (–100%). Details on RSV of MI symptoms are presented in Table 1.

These changes in search volume for MI symptoms have not been accompanied by an increase in interest in terms related to respiratory tract infection symptoms and urological complaints in most countries. We observed an increase in ASV for RTI symptoms only in the UK (+42.54%), and Italy (+2.59%). No significant differences have been shown in the data from Spain and France. Furthermore, in Germany, Poland and Russia, ASV for symptoms of RTI decreased (–2.59%; –37.36%, and –18.58%, respectively). The search volume for queries associated with urological complaints remained unchanged in Spain, France, Germany, and Poland. It decreased in the UK (–24.00%), Italy (–12.24%), and Russia (–3.00%). Interestingly, these were accompanied by a higher interest in health-unrelated queries in all studied countries (UK: +19.93%, ES: +38.82%, FR: +36.44%, DE: +27.25%, IT: +25.41%, PL: +20.61%, RU: +7.50%). Detailed estimates of interest in queries related to respiratory and urological complaints, as well as terms not associated with health, are available in the Appendices (Table S1, Table S2, and Table S3, respectively).

Discussion

In our study, we demonstrate that in all seven countries queries related to MI symptoms were searched more frequently during the COVID-19 lockdown than before. Our results are consistent with several other studies that revealed an increase in the search frequency for *chest pain* in numerous countries during the pandemic [17–20]. However, we have not observed an increase in interest in the term "*myocardial infarction symptoms*" in most countries. The discrepancy between the search volumes for the general phrase and particular symptoms may stem from the fact that patients

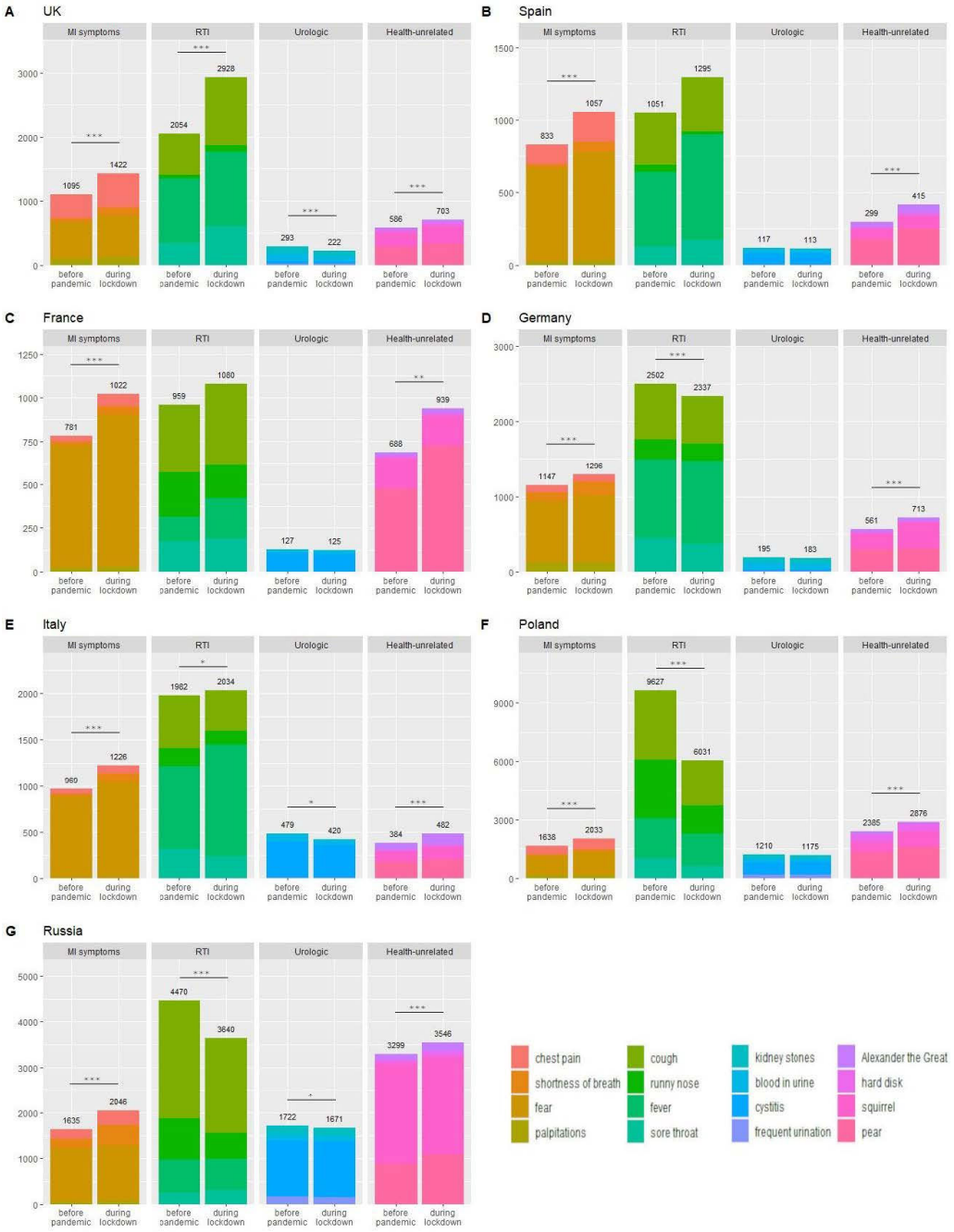

Fig. 1. The cumulative adjusted search volumes (ASV) for particular symptoms of myocardial infarction (MI), respiratory tract infection (RTI) and urologic complaints, followed by health-unrelated terms for seven European countries. Wilcoxon signed-rank test: *p <0.05, **p <0.01, ***p <0.001.

Table 1. Relative search volumes (RSV) of myocardial infarction symptoms between 22 March and 4 July 2020 and the corresponding weeks from 2017–2019 (data for each of the particular MI symptoms and the general term "*myocardial infarction symptoms*").

	Country	Median RSV of 2017–2019 (IQR)	Median RSV in 2020 (IQR)	p-value	
Chest pain	United Kingdom	24.67 (3)	31 (11)	<0.001	↗
	Spain	9 (1.33)	12 (5)	0.001	↗
	France	2 (0.67)	4 (2)	0.001	↗
	Germany	6 (0.66)	6 (1)	0.02	↗
	Italy	4 (1.17)	5 (2)	0.001	↗
	Poland	28 (5.33)	33 (13.5)	0.005	↗
	Russia	13.67 (2)	20 (5.5)	<0.001	↗
Shortness of breath	United Kingdom	3.33 (0.67)	6 (3.5)	0.001	↗
	Spain	1.67 (0.33)	4 (3)	<0.001	↗
	France	1.33 (0.67)	3 (2)	0.002	↗
	Germany	7.66 (0.83)	10 (4)	<0.001	↗
	Italy	2 (0)	6 (3.5)	<0.001	↗
	Poland	6 (1.17)	8 (2.5)	0.002	↗
	Russia	14.67 (2.33)	29 (11)	<0.001	↗
Fear	United Kingdom	38.67 (3.67)	44 (2.5)	0.003	↗
	Spain	43.67 (4.33)	50 (10)	0.003	↗
	France	48 (3.33)	58 (8)	0.001	↗
	Germany	54.67 (1.67)	59 (7)	0.004	↗
	Italy	58 (2.33)	67 (15.5)	0.006	↗
	Poland	66.67 (6.63)	78 (13.5)	0.001	↗
	Russia	77 (4.67)	80 (11.5)	0.20	
Palpitations	United Kingdom	6.67 (0.83)	8 (1.5)	0.001	↗
	Spain	1.67 (0.5)	2 (0.5)	0.007	↗
	France	1.33 (0.67)	2 (1)	0.01	↗
	Germany	8.67 (1.5)	8 (1)	0.64	
	Italy	0.67 (0.17)	1 (1)	0.95	
	Poland	9.67 (2)	10 (3.5)	0.59	
	Russia	4 (0.5)	5 (2)	0.01	↗
Myocardial infarction symptoms	United Kingdom	2 (0.33)	2 (1)	0.21	
	Spain	0.33 (0.17)	0 (0)	0.04	↘
	France	0 (0.17)	0 (0)	0.58	
	Germany	2.33 (0.33)	3 (0.5)	0.07	
	Italy	3.67 (1.17)	3 (1)	0.53	
	Poland	7 (1.83)	10 (3.5)	0.01	↗
	Russia	1.67 (0.67)	2 (0)	0.62	

were looking for information on the symptoms they experienced or witnessed, not because of concern for the MI itself.

In spite of the increased search volume for the selected queries unrelated to health, the growth in interest in MI symptoms cannot be explained simply by the growing interest in medicine due to the pandemic outbreak, or by enhanced Internet traffic. We observed that the onset of the pandemic led to an increased interest in the symptoms of respiratory tract infection only in the UK and Italy and remained without significant changes in Spain and France. Surprisingly, we noticed a decrease in Germany, Poland, and Russia, which could have been caused by a decline in the incidence of respiratory tract infections as a result of isolation, with a relatively low prevalence of coronavirus infections in spring of 2020 [21–23]. Furthermore, there has been no growth in queries related to urological complaints in any of the studied countries, although a decline in admissions to emergency departments of urology was observed [24–26]. One possible explanation is that, since these conditions are commonly recurrent, patients were able to attribute their symptoms to their previously diagnosed diseases and manage them. In conclusion, an increase in interest in MI-related queries cannot be explained by a general rise in popularity of health-related topics.

These findings may suggest that patients who could experience MI symptoms during lockdown, rather than calling for help, would be more likely to search for information on their symptoms online compared to the pre-pandemic era. Our hypothesis is supported by the results of Senecal *et al.*, who showed a rise in the search volume for *home remedies for chest pain* and *natural remedies for chest pain* in the USA, UK, Spain, and Italy [19].

This trend is very concerning and may delay the onset of adequate therapy, thereby contributing to the increase in the time from symptom onset to calling an ambulance, observed among MI patients in Lithuania [27], the worsening condition of patients presenting to emergency departments in Portugal [28], and a significant increase in the number of out-of-hospital-cardiac-arrests observed during the pandemic in France and Italy [29, 30]. Simultaneously, a drop in acute coronary syndrome admissions in Northern California (USA), and a decrease in the number of coronary angiography procedures performed worldwide were observed [5–9].

One reasonable explanation is fear of the impact of the COVID-19 pandemic on the capacity of healthcare systems and their perceived decrease in ability to provide patients with sufficient medical help [3, 10]. Furthermore, some patients may not have been aware of the significance of their symptoms. This hypothesis is supported by the fact that awareness of MI symptoms in the general population tends to be low. In our previous study, we showed that only 73% and 54% of rural patients in Poland were able to recognise chest pain and shortness of breath as MI symptoms, respectively [10]. Finally, some of the MI symptoms, such as chest pain, may have been attributed to COVID-19 infection [3].

Several strong advantages of our study can be identified. Firstly, we selected five different queries related to MI symptoms, which significantly improved the specificity of obtained results, compared to previous studies. Furthermore, our analysis was followed by the application of three additional groups, which allowed us to contextualize the data and finally to conclude that the results obtained were not an effect of the increased public interest in medicine due to the COVID-19 outbreak, the enhanced cyber traffic caused by lockdowns, or any random fluctuations in search volume in the studied period. In addition, the analysis covered seven populous European countries, differing in their social and cultural conditions, as well as the organization of their healthcare systems and strategies implemented to counteract the pandemic. Regardless of these differences, we obtained consistent results that allow us to rule out the exclusive impact of factors specific to any country studied. Finally, inasmuch as our findings might be attributable to the fact that MI patients tended to search the Internet instead of calling emergency services during the pandemic, these results appear concordant with a significant decline in MI patients' hospital admissions, as well as a drop in the number of life-saving procedures performed, accompanied by an increase in patient's fear of contact with healthcare services.

However, our method has certain limitations. Firstly, the studied symptoms cannot be perceived as pathognomonic for MI. In other words, they might occur in the course of other diseases. The impact of this fact on the results of our analysis was reduced by including five different queries related to MI symptomatology. Consequently, the increased interest in phrases related to MI may not only be an effect of the growing need for medical advice in case of symptom onset, but also of any other cause resulting in a rise in popularity of the topic, for instance public service campaigns, or publicized health problems of famous persons [13]. However, we do not consider these factors to be significant in the studied period, during which COVID-19 remained the top news story. Lastly, the studied population cannot be perceived as equivalent to the population in the high-risk group for MI occurrence, due to different patterns in Internet usage as a way of gathering information and dealing with emergency situations among people in different groups of age, gender, education, and ethnicity.

Our analysis revealed an increased popularity of queries related to particular MI symptoms during the COVID-19 pandemic in all studied countries. This general trend contrasted with the lack of a consistent tendency for queries regarding respiratory or urological complaints. Since there was a reduction in hospital admissions of MI patients and a decrease in the number of emergency coronary angiography procedures performed, it may be concluded that patients experiencing MI symptoms during COVID-19 lockdowns were more likely to self-diagnose and seek help on their own using the health information available online, which could delay, or even sub-

stitute, calling an ambulance. This might have resulted in an increase in time-to-reperfusion and in out-of-hospital-cardiac-arrests.

In summary, we demonstrated the growing role of information available in Internet in the patient-dependent phase of MI management, the reliability of which can determine the time from the onset of symptoms to the professional medical intervention. This indicates an urgent need to provide reliable, easily accessible, and comprehensible online health information prepared by medical professionals. Therefore, we strongly recommend giving a more prominent role to online health education in the formulation of local health policies. Finally, we emphasize the unchanging importance of patients' education in their ability to immediately recognize MI symptoms and appropriately respond to them.

Author contributions

All authors contributed to the conceptualization of the study and the development of the methodology. D.F. was responsible for formal analysis, investigation, data curation, project administration, software, and visualisation. M.K. contributed to the data curation and investigation. D.F. and M.K. have verified the underlying data and analyses. Supervision was provided by A.S. All authors were involved in the interpretation of the results and contributed to the writing of the final version of the manuscript. All authors agreed with the results and conclusions, and approved the final draft.

Acknowledgments

We thank Mr. Maciej Proszek for his help in linguistic correction.

Role of funding source

This research did not receive any specific grant from funding agencies in the public, commercial, or not-for-profit sectors.

Ethics approval

The study do not involve any human or animal subjects.

Consent to participate

The study do not involve human subjects.

Consent to publish

The manuscript does not contain any individual person's data in any form.

Availability of data and material according to the ICMJE requirements

Will individual participant data be available (including data dictionaries)?	Not applicable
What data in particular will be shared?	All of numeric data collected during the study
What other documents will be available?	Study protocol, statistical analysis plan, analytic code
When will data be available (start and end dates)?	Immediately following publication; no end date
With whom?	Anyone who wishes to access the data
For what types of analyses?	Any purpose
By what mechanism will data be made available?	Data are available indefinitely at Mendeley Data, https://doi.org/10.17632/gd6gkvf446.1

Conflict of interest

None declared.

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Appendices

Table of contents

Data acquisition plan

- Period imported: 2017-10-1 – 2021-10-31.
- Countries studied: UK, Spain, Italy, France, Germany, Poland, Russia.
- Adjustment method based on:

Jonathanbriggs. *How do you compare large numbers of items in Google Trends? — Digital Jobs To Be Done*, https://digitaljobstobedone.com/2017/07/10/how-do-you-compare-large-numbers-of-items-in-google-trends/ (2017, accessed 14 February 2022).

- Final data preparation: <1 → 0, two decimal places.

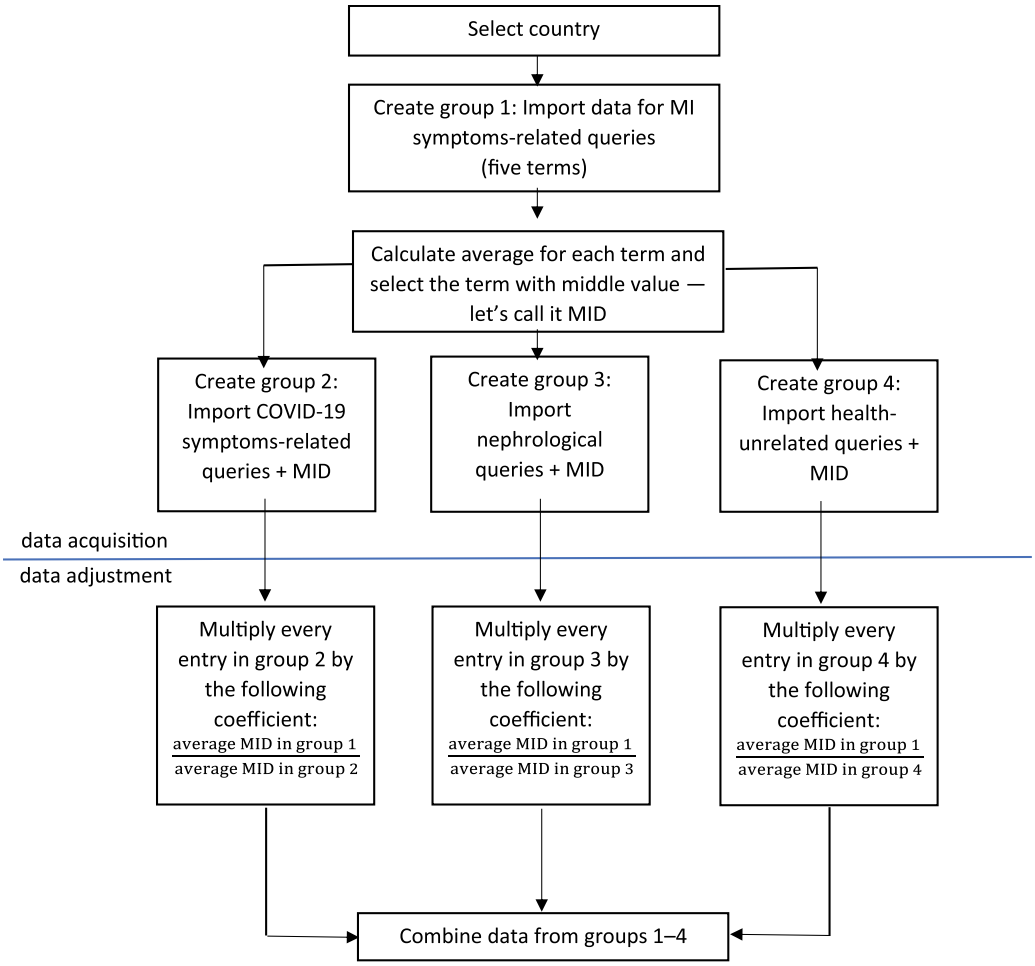

Fig. S1. Data acquisition scheme.

Table S1. Adjusted search volumes (ASV) of respiratory tract infection symptoms between 22 March and 4 July 2020 and corresponding weeks from 2017–2019.

	Country	Median RSV of 2017–2019 (IQR)	Median RSV in 2020 (IQR)	p-value	
Cough	United Kingdom	41.85 (9.85)	44.31 (35.08)	0.1320	
	Spain	23.82 (3.66)	18.32 (16.49)	0.4427	
	France	24.67 (7.05)	21.15 (17.18)	0.3786	
	Germany	46.25 (17.34)	31.53 (20.5)	0.0500	
	Italy	37.76 (9.44)	21.58 (21.58	**0.0247**	↘
	Poland	212.09 (61.09)	117.57 (86.45)	**0.0041**	↘
	Russia	168.79 (32.85)	118.95 (50.98)	0.0649	
Runny nose	United Kingdom	3.69 (0)	3.69 (3.69)	0.0545	
	Spain	3.05 (0.61)	1.83 (1.83)	**0.0009**	↘
	France	15.86 (6.17)	10.57 (5.95)	**0.0214**	↘
	Germany	17.9 (7.36)	12.61 (7.89)	0.0568	
	Italy	12.59 (2.25)	8.09 (6.74)	**0.0023**	↘
	Poland	195.95 (44.95)	76.07 (48.41)	**0.0007**	↘
	Russia	61.17 (13.59)	30.59 (10.2)	**0.0006**	↘
Fever	United Kingdom	65.24 (8.62)	66.47 (22.16)	0.3065	
	Spain	34.2 (3.05)	40.31 (19.24)	**0.0184**	↗
	France	9.25 (1.32)	11.89 (3.3)	**0.0007**	↗
	Germany	67.27 (3.15)	63.07 (12.61)	0.6694	
	Italy	59.34 (3.15)	72.82 (36.41)	**0.0156**	↗
	Poland	136.01 (12.68)	110.65 (20.75)	**0.0016**	↘
	Russia	47.58 (7.37)	44.18 (13.59)	0.1321	
Sore throat	United Kingdom	23.39 (3.69)	29.54 (14.77)	**0.0007**	↗
	Spain	8.55 (2.14)	9.16 (4.58)	**0.0174**	↗
	France	11.45 (1.54)	10.57 (5.29)	0.3940	
	Germany	29.43 (6.31)	22.07 (6.31)	**0.0234**	↘
	Italy	20.68 (4.94)	13.49 (8.09)	**0.0097**	↘
	Poland	69.16 (8.07)	34.58 (20.75)	**0.0016**	↘
	Russia	16.99 (2.27)	16.99 (6.8)	**0.0442**	

Table S2. Adjusted search volumes (ASV) of urology — associated queries between 22 March and 4 July 2020 and corresponding weeks from 2017–2019.

	Country	Median RSV of 2017–2019 (IQR)	Median RSV in 2020 (IQR)	p-value	
Kidney stones	United Kingdom	7.28 (1.09)	6.26 (0.76)	**0.0026**	↘
	Spain	0.38 (0.24)	0.43 (0.43)	0.5934	
	France	0.15 (0.26)	0.22 (0.16)	0.9095	
	Germany	5 (0.35)	5 (0.73)	0.3457	
	Italy	0.53 (0.53)	0 (1.6)	0.6083	
	Poland	11.14 (1.24)	9.65 (2.23)	**0.0046**	↘
	Russia	13.96 (2.59)	13.96 (1.55)	0.1092	
Blood in urine	United Kingdom	7.53 (0.53)	5.19 (0.84)	**0.0007**	↘
	Spain	2.15 (0.65)	1.87 (1.15)	0.1152	
	France	1.36 (0.62)	1.21 (0.55)	0.8202	
	Germany	6.25 (0.24)	5 (0.73)	**0.0032**	↘
	Italy	4.79 (0.53)	3.2 (1.6)	**0.0055**	↘
	Poland	15.35 (3.34)	11.88 (2.6)	**0.0032**	↘
	Russia	7.76 (1.81)	7.76 (2.33)	0.0577	
Bladder infection	United Kingdom	2.7 (0.08)	2.29 (0.38)	**0.0009**	↘
	Spain	4.5 (0.74)	4.31 (1.58)	0.9773	
	France	6.78 (0.49)	6.93 (1.59)	0.9095	
	Germany	1.25 (0.21)	1.25 (0.42)	0.7003	
	Italy	25.57 (1.07)	22.37 (3.2)	**0.0075**	↘
	Poland	42.83 (4.33)	46.05 (6.31)	0.0500	
	Russia	81.17 (5.17)	82.21 (10.86)	1.000	
Frequent urination	United Kingdom	1.53 (0.15)	1.37 (0.46)	**0.0169**	↘
	Spain	0.38 (0.26)	0.29 (0.5)	0.3633	
	France	0 (0.07)	0 (0)	0.6692	
	Germany	0.56 (0.17)	0.63 (0.21)	0.2328	
	Italy	0 (0.53)	0 (0)	0.7193	
	Poland	12.13 (2.72)	11.14 (3.34)	0.9095	
	Russia	11.37 (1.29)	9.31 (2.33)	**0.0200**	↘

Table S3. Adjusted mean search volumes (ASV) of terms unrelated to health between 22 March and 4 July 2020 and corresponding weeks from 2017–2019.

	Country	Median RSV of 2017–2019 (IQR)	Median RSV in 2020 (IQR)	p-value	
Alexander the Great	United Kingdom	2.36 (0.48)	2.57 (0.48)	0.2583	
	Spain	2.1 (0.67)	4.3 (1.15)	**0.0013**	↗
	France	1.52 (0.46)	1.82 (0.91)	0.0736	
	Germany	2.07 (0.49)	2.55 (0.55)	**0.0145**	↗
	Italy	5.28 (2.24)	8.68 (5.32)	**0.0003**	↗
	Poland	6.85 (4.36)	5.61 (0)	0.0834	
	Russia	8.58 (2.15)	10.73 (6.44)	**0.0082**	↗
Hard disk	United Kingdom	2.89 (0.27)	2.89 (0.64)	0.6490	
	Spain	0.86 (0.43)	0.86 (0.57)	0.8201	
	France	0.91 (0.3)	0.91 (0)	0.7740	
	Germany	1.46 (0.3)	1.09 (0.36)	0.1214	
	Italy	0.8 (0.18)	1.09 (0.11)	**0.0056**	↗
	Poland	29.28 (3.43)	26.16 (3.74)	0.0570	
	Russia	5.72 (1.43)	8.58 (1.07)	**0.0007**	↗
Squirrel	United Kingdom	15.64 (0.91)	19.61 (3.37)	**0.0020**	↗
	Spain	4.59 (0.48)	6.31 (1.87)	**0.0451**	↗
	France	11.84 (1.21)	10.93 (2.28)	0.5561	
	Germany	13.87 (0.97)	22.62 (3.65)	**0.0007**	↗
	Italy	7.24 (0.98)	9.77 (1.19)	**0.0013**	↗
	Poland	33.02 (5.61)	50.46 (13.08)	**0.0002**	↗
	Russia	141.59 (21.81)	141.59 (22.9)	0.2802	
Pear	United Kingdom	18.11 (0.75)	22.5 (1.77)	**0.0007**	↗
	Spain	11.96 (0.77)	16.64 (4.02)	**<0.0001**	↗
	France	31.57 (9.86)	46.44 (28.68)	**0.0007**	↗
	Germany	19.95 (2.86)	21.16 (2.01)	0.1670	
	Italy	11.94 (1.74)	13.67 (1.3)	**0.0041**	↗
	Poland	87.84 (14.64)	108.40 (15.89)	**0.0009**	↗
	Russia	57.21 (12.87)	64.36 (27.89)	**0.0014**	↗

Table S4. Data acquisition details.

	Country	Time period searched	Query category	Access date	Full Search input	Rationale
Chest pain	United Kingdom	2017-10-1–2021-10-31	All query categories were used	2022-02-16	chest pain	These are common symptoms of myocardial infarction and search frequency of 'chest pain' and 'shortness of breath' has been proven to correlate with coronary heart disease epidemiology.
	Spain			2022-02-15	dolor pecho	
	France			2022-02-16	douleur thoracique	
	Germany			2022-02-16	Brustschmerzen	
	Italy			2022-02-16	dolore al petto	
	Poland			2022-02-15	ból w klatce	
	Russia			2022-02-16	боль в груди	
Shortness of breath	United Kingdom			2022-02-16	shortness of breath	
	Spain			2022-02-15	disnea	
	France			2022-02-16	essoufflement	
	Germany			2022-02-16	Atemnot	
	Italy			2022-02-16	dispnea	
	Poland			2022-02-15	duszność	
	Russia			2022-02-16	одышка	
Fear	United Kingdom			2022-02-16	fear	
	Spain			2022-02-15	miedo	
	France			2022-02-16	peur	
	Germany			2022-02-16	Angst	
	Italy			2022-02-16	paura	
	Poland			2022-02-15	strach	
	Russia			2022-02-16	страх	
Palpitations	United Kingdom			2022-02-16	palpitations	
	Spain			2022-02-15	palpitaciones	
	France			2022-02-16	palpitation	
	Germany			2022-02-16	Herzrasen	
	Italy			2022-02-16	cardiopalmo	
	Poland			2022-02-15	kołatanie serca	

Table S4. cont.

	Country	Time period searched	Query category	Access date	Full Search input	Rationale
	Russia			2022-02-16	учащенное сердцебиение	
Myocardial infarction symptoms	United Kingdom			2022-02-16	heart attack symptoms	The term might reflect patients' concern with myocardial infarction occurrence.
	Spain			2022-02-15	infarto síntomas	
	France			2022-02-16	crise cardiaque symptômes	
	Germany			2022-02-16	Herzinfarkt Symptome	
	Italy			2022-02-16	sintomi infarto	
	Poland			2022-02-15	zawał objawy	
	Russia			2022-02-16	симптомы инфаркта	
Cough	United Kingdom			2022-02-16	cough	These are common symptoms of respiratory tract infections, Their search frequency might have been influenced by the COVID-19 pandemic.
	Spain			2022-02-15	tos	
	France			2022-02-16	toux	
	Germany			2022-02-16	Husten	
	Italy			2022-02-16	tosse	
	Poland			2022-02-15	kaszel	
	Russia			2022-02-16	кашель	
Runny nose	United Kingdom			2022-02-16	runny nose	
	Spain			2022-02-15	catarro	
	France			2022-02-16	rhume	
	Germany			2022-02-16	Schnupfen	
	Italy			2022-02-16	catarro	
	Poland			2022-02-15	katar	
	Russia			2022-02-16	насморк	
Fever	United Kingdom			2022-02-16	fever	
	Spain			2022-02-15	fiebre	
	France			2022-02-16	fièvre	

Table S4. cont.

	Country	Time period searched	Query category	Access date	Full Search input	Rationale
	Germany			2022-02-16	Fieber	
	Italy			2022-02-16	febbre	
	Poland			2022-02-15	gorączka	
	Russia			2022-02-16	лихорадка	
Sore throat	United Kingdom	2017-10-1–2021-10-31	All query categories were used	2022-02-16	sore throat	These are common symptoms and diseases unrelated to COVID-19 pandemic outbreak that should demonstrate changes in general interest in medicine.
	Spain			2022-02-15	dolor de garganta	
	France			2022-02-16	mal de gorge	
	Germany			2022-02-16	Halsschmerzen	
	Italy			2022-02-16	mal di gola	
	Poland			2022-02-15	ból gardła	
	Russia			2022-02-16	боль в горле	
Kidney stones	United Kingdom			2022-02-16	kidney stones	
	Spain			2022-02-15	litiasis renal	
	France			2022-02-16	lithiase urinaire	
	Germany			2022-02-16	Nierensteine	
	Italy			2022-02-16	calcolo renale	
	Poland			2022-02-15	kamica nerkowa	
	Russia			2022-02-16	камни в почках	
Blood urine	United Kingdom			2022-02-16	blood urine	
	Spain			2022-02-15	sangre orina	
	France			2022-02-16	sang urine	
	Germany			2022-02-16	Blut im Urin	
	Italy			2022-02-16	sangue urine	
	Poland			2022-02-15	krew w moczu	
	Russia			2022-02-16	кровь в моче	
Cystitis	United Kingdom			2022-02-16	bladder infection	
	Spain			2022-02-15	cistitis	

Table S4. cont.

	Country	Time period searched	Query category	Access date	Full Search input	Rationale
	France			2022-02-16	cystite	
	Germany			2022-02-16	Zystitis	
	Italy			2022-02-16	cistite	
	Poland			2022-02-15	zapalenie pęcherza	
	Russia			2022-02-16	цистит	
Frequent urination	United Kingdom			2022-02-16	frequent urination	
	Spain			2022-02-15	polaquiuria	
	France			2022-02-16	frequente urine	
	Germany			2022-02-16	häufiges Wasserlassen	
	Italy			2022-02-16	minzione frequente	
	Poland			2022-02-15	częste oddawanie moczu	
	Russia			2022-02-16	частое мочеиспускание	
Alexander the Great	United Kingdom			2022-02-16	Alexander the Great	These are terms unrelated to the COVID-19 pandemic and to one another, being simultaneously well-known in Europe. They are supposed to reflect the general Internet traffic, since to our best knowledge during the analysed months there
	Spain			2022-02-15	Alejandro Magno	
	France			2022-02-16	Alexandre le Grand	
	Germany			2022-02-16	Alexander der Große	
	Italy			2022-02-16	Alessandro Magno	
	Poland			2022-02-15	Aleksander Wielki	
	Russia			2022-02-16	Александр Македонский	
Hard disk	United Kingdom			2022-02-16	hard disk	
	Spain			2022-02-15	hard disk	

Table S4. cont.

	Country	Time period searched	Query category	Access date	Full Search input	Rationale
	France			2022-02-16	hard disk	were no other causes for changes in their frequency.
	Germany			2022-02-16	Hard Disk	
	Italy			2022-02-16	disco rigido	
	Poland			2022-02-15	dysk twardy	
	Russia			2022-02-16	жёсткий диск	
Squirrel	United Kingdom			2022-02-16	squirrel	
	Spain			2022-02-15	ardilla	
	France			2022-02-16	ecureuil	
	Germany			2022-02-16	Eichhörnchen	
	Italy			2022-02-16	scoiattolo	
	Poland			2022-02-15	wiewiórka	
	Russia			2022-02-16	белка	
Pear	United Kingdom			2022-02-16	pear	
	Spain			2022-02-15	pera	
	France			2022-02-16	poire	
	Germany			2022-02-16	Birne	
	Italy			2022-02-16	pera	
	Poland			2022-02-15	gruszka	
	Russia			2022-02-16	груша	

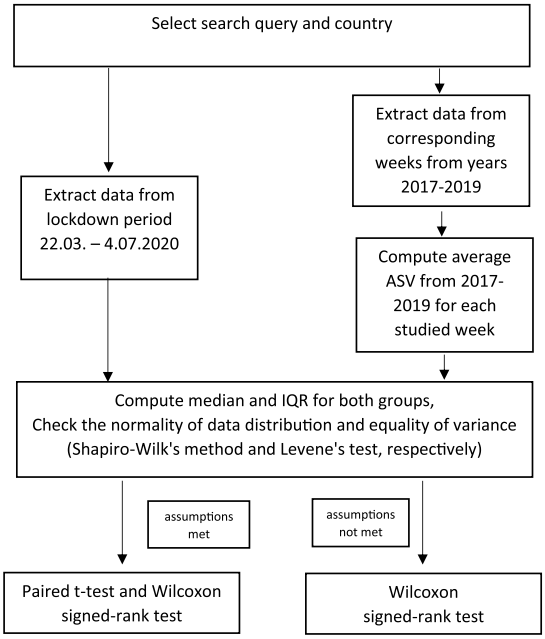

Fig. S2. The statistical analysis plan for individual queries.

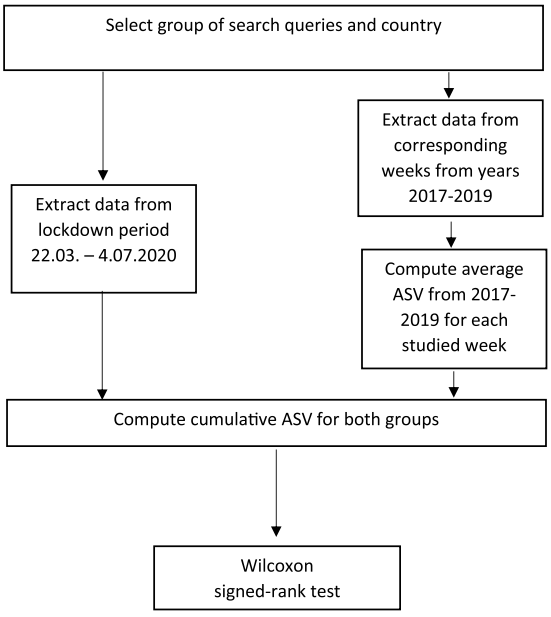

Fig. S3. The statistical analysis plan for groups of queries.